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THE EFFECT OF FEEDER AND FLOOR SPACE UPON GROWING TURKEYS IN CONFINEMENT

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The amount of feeder and floor space allowed per bird has a direct relationship with the profitable operation of a turkey enterprise; because the volume of the operation will be in proportion to the rated capacity of the house and equipment. Under these conditions it is desirable to know the minimum amounts of feeder and floor space consistent with economical growth. These studies have concentrated more on feeder space than on floor space due to an interaction experienced between these variables in the one trial between feeder and floor space.

Literature Review

Roberts (1956), Siegel and Coles (1958), Clark **et al.** (1953) and Heishman **et al.** (1952) found that with broiler chickens that 0.5 square foot of floor space per bird consistently was more profitable than larger amounts as long as the selling price was above the costs of production. Average body weight was in general slightly less; but returns were greater because of the larger volume. Hartung (1955), however, found a progressive improvement in average body weight, feed conversion and dressed market quality of chicken broilers as the amount of floor space was increased from 0.5 to 1.25 square feet per bird.

Roberts (1956) found practically no difference in rate of growth when broiler chickens were provided with 0.5 up to a maximum of 2.3 linear inches of feeder space per bird. Lanson **et al.** (1956) compared trough and tube-type feeders with broiler chicks; but allowed slightly less than one-half as much feeder space with the tube-type feeders and found no differences in rate of growth. The trough feeder space tested was 2.85 and 3.45 linear inches per chick. Kreuger **et al.** (1957)

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reported that broiler chicks provided with three linear inches of feeder space were heavier than chicks receiving smaller amounts of feeder space. However, McCluskey and Johnson (1958) reported that with feeder space allowances of from one-half to three linear inches per chick there were no consistent significant differences in growth.

The experimental data of the effect of feeder and floor space upon the growth of turkeys is limited. Wilson and Woodard (1954) concluded that with turkeys two linear inches of trough feeder space was required to eight weeks of age. Some common recommendations vary from two to six linear inches per turkey.

Experimental Procedure

The first groups of turkeys in this study were started September 26, 1955. Succeeding groups were started June 14, 1956, November 6, 1956, May 27, 1957, November 1, 1957, April 14, 1958, November 25, 1958, December 23, 1958 and September 10, 1959. The first groups of turkeys were provided with trough feeders to eight weeks of age. Thereafter, in starting the poults, trough feeders were used for the first three weeks and tube-type hanging feeders were used to the particular age that the experiment was terminated. The circumference of the pan over which the birds had to feed was used in calculating the amount of feeder space available with the tube-type feeders.

In every instance the poults were sexed and wing banded at day-old. Equal numbers of both sexes were randomly distributed into each pen. A spare pen of each sex was maintained and any losses were replaced as they occurred from the spare pens. In the floor space studies, water space was adjusted to compensate for the difference in the number of poults.

The Ohio Turkey Starter containing 26% protein and 800 Calories per pound was fed from day-old to eight weeks. From 8 to 16 weeks the ration fed contained 20% protein and approximately 850 Calories per pound. A finishing ration of 16% protein with approximately 900 Calories per pound was fed from 16 to 24-weeks (Yacowitz and March, 1954). All rations were in the form of all-mash.

All turkeys were weighed at four-week intervals with feed conversion data calculated at intervals of eight-weeks. Mortality was recorded in every trial.

Results

It should be pointed out that all data were analysed by means of the analysis of variance, using the group-to-group method.

The average weights, feed conversion and total mortality for the first group of Small-type White turkeys to eight weeks are presented in Table 1. The only significant difference was obtained with the lesser amount of trough feeder space. This may be partially explained by the fact that for a five-day period the groups with one linear inch of feeder space were fed more often in order to keep feed available to the turkeys

TABLE 1.—Average body weights, feed conversion and mortality of Small-type White turkeys as affected by floor and feeder space

0 to 8 weeks

Floor space per poult (sq. ft.)	Feeder space† per poult (linear inches)	Av. wt.* (grams)	Feed conv. (lbs.)	Mortality (total No. died)
1	1‡	1260	2.3	7
	3‡	1134	2.7	18
2	1§	1310	2.2	7
	3§	1182	2.2	7

L.S.D. $P < .01 = 132$ gram.

*Average of males and females combined.

†Trough feeders were used throughout this period.

‡Average of duplicate groups of 120 poults each.

§Average of duplicate groups of 60 poults each.

TABLE 2.—Average gain, feed conversion and mortality of Small-type White turkeys as affected by floor and feeder space

16 to 24 weeks

Floor space per poult (sq. ft.)	Feeder space per poult† (linear inches)	Av. gain (lbs.)		Feed conv. (lbs.)	Mortality (total No. died)
		Males	Females		
3.2	1.6‡	5.7	2.4	8.4	3
	3.2‡	5.8	2.4	8.2	3
5.5	1.6§	5.7	2.8*	8.6	3
	3.2§	6.0	2.8*	8.4	1

*Significant $P < .05$.

†Tube-type hanging feeders were used in this test.

‡Average of duplicate groups of 170 poults each.

§Average of duplicate groups of 100 poults each.

at all times. After this five day period all pens were fed the same number of times daily. The weights of both sexes were combined in this particular phase. The turkeys were a Beltsville × Wahkeen cross. There was no significant effect due to floor space, but the litter required more frequent stirring with the one square foot of floor space to keep it in a satisfactory condition.

TABLE 3.—Effect of feeder space on growth, feed conversion and mortality of Small-type White turkeys*

0 to 8 weeks†

Feeder space per poult‡ (linear inches)	Av. wt. (grams)		Feed conv. (lbs.)	Mortality (total No. died)
	Males	Females		
0.53	1295	1056	2.0	28
1.06	1295	1073	2.2	22
1.59	1333	1075	2.0	8
	NS	NS	NS	

*Floor space was two square feet per poult.
†Average of triplicate groups of 100 poults each.
‡Trough feeders were used to three-weeks and tube-type hanging feeders thereafter.
NS—Non-significant differences among treatments.

TABLE 4.—Effect of feeder space on growth, feed conversion and mortality of Small-type White turkeys*

8 to 16 weeks†

Feeder space per poult† (linear inches)	Av. wt. (lbs.)		Feed conv. (lbs.)	Mortality (total No. died)
	Males	Females		
0.66	9.2	6.3	3.7	2
1.32	9.1	6.5	3.7	4
1.98	9.4	6.6	3 6	4
	NS	NS	NS	

*Floor space was two and one-half square feet per poult
†Average of triplicate groups of 80 poults each.
‡Tube-type hanging feeders used throughout

These same poults were transferred to a pole shelter shortly after they were eight weeks of age; but data were only collected for the 16 to 24-week period. The results of this phase are presented in Table 2. The only significant difference observed was a depression in average gain of the females with 3.2 as compared to 5.5 square feet of floor space per bird.

TABLE 5.—Effect of feeder space on growth, feed conversion and mortality of Small-type White turkeys*

16 to 24 weeks†

Feeder space per poult† (linear inches)	Av. wt. (lbs.)		Feed conv. (lbs.)	Mortality (total No. died)
	Males	Females		
1	14.7	8.6	7.0	0
2	14.4	8.7	7.3	0
3	14.7	8.8	7.3	1
	NS	NS	NS	

*Floor space was four square feet per poult.
†Average of triplicate groups 50 poults each.
‡Tube-type hanging feeders used throughout.

TABLE 6.—Effect of floor and feeder space upon growth, feed conversion and mortality of Small-type White turkeys

0 to 8 weeks

Floor space per poult (sq. ft.)	Feeder space* per poult (linear inches)	Av. wt.† (grams)	Feed conv. (lbs.)	Mortality (total No. died)
1.2	0.53‡	1084	2.6	16
	1.06‡	1187	2.6	11
2.4	0.53§	1199	2.5	5
	1.06§	1180	2.6	5

Interaction between feeder and floor space was significant ($P < .05$).
*Trough feeders to three weeks and tube-type hanging feeders thereafter.
†Males and females combined.
‡Average of duplicate groups of 100 poults each.
§Average of duplicate groups of 50 poults each.

Table 3 presents the effects on growth, feed conversion and mortality of feeder space with Small-type White turkeys to eight weeks of age. Floor space was kept constant and feeder space was the only variable. There were no significant differences due to the different amounts of feeder space.

TABLE 7.—Effect of floor and feeder space upon growth, feed conversion and mortality of Small-type White turkeys

8 to 16 weeks

Floor space per poult (sq. ft.)	Feeder space per poult† (linear inches)	Av. wt. (lbs.)		Feed conv. (lbs.)	Mortality (total No. died)
		Males	Females*		
2	0.88‡	9.0	6.3	4.2	4
	1.77‡	9.0	6.5	4.0	5
	2.65‡	9.2	6.6	4.0	8
3	0.88§	8.8	6.1	4.4	1
	1.77§	8.7	6.2	4.3	5
	2.65§	8.5	6.1	4.2	5
		NS		NS	

*L.S.D. $P < .05 = 0.2$ due to floor space with females.
†Tube-type hanging feeders used throughout.
‡Average of duplicate groups of 60 poults each.
§Average of duplicate groups of 40 poults each.

TABLE 8.—Effect of feeder space upon growth, variation, feed conversion and mortality of Small-type White turkeys*

0 to 8 weeks†

Feeder space per poult‡ (linear inches)	Av. wt. (grams)				Feed conv. (lbs.)	Mortality (total No. died)
	Males	c.v.	Females	c.v.		
0.5	1327	13.1	1064	10.4	2.5	16
1.0	1348	10.5	1079	13.5	2.5	15
1.5	1367	12.7	1095	12.6	2.5	19
	NS		NS		NS	

*Floor space was constant at two square feet per poults.
†Average of five replicate groups of 60 poults each.
‡Trough feeders were used to three-weeks and tube-type hanging feeders thereafter
c.v.—coefficient of variation.

The poults used for the data obtained in Table 3 were continued to 16-weeks and 24-weeks and the data are presented in Tables 4 and 5, respectively. In each instance the groups provided with the least amount of feeder space were the same during each phase of the experiment. There were no significant differences in either phase due to feeder space.

TABLE 9.—Effect of feeder space upon growth, feed conversion and mortality of Large-type White turkeys*

0 to 8 weeks†

Feeder space per poult‡ (linear inches)	Av. wt. (grams)		Feed conv. (lbs.)	Mortality (total No. died)
	Males	Females		
1.0	1532	1262	2.2	9
1.5	1522	1260	2.5	9
2.0	1525	1261	2.4	12
	NS	NS	NS	

*Floor space was constant with two square feet per poult.
†Average of duplicate groups of 80 poults each.
‡Trough feeders were used to three-weeks and tube-type hanging feeders thereafter.

TABLE 10.—Effect of feeder space upon growth, feed conversion and mortality upon Large-type White turkeys*

8 to 16 weeks†

Feeder space per poult† (linear inches)	Av. wt. (lbs.)		Feed conv. (lbs.)	Mortality (total No. died)
	Males	Females		
1.5	11.4	8.6	3.2	1
2.0	11.4	8.6	3.1	0
2.5	11.3	8.7	3.3	1
	NS	NS	NS	

*Floor space was constant with four square feet per poult.
†Average of four replicate groups of 45 poults each.
‡Tube-type hanging feeders used throughout.

Floor and feeder space allowances based on previous experiments were altered and the data are presented in Table 6 for Small-type White turkeys. In this instance the interaction between floor and feeder space was significant and indicated that both floor and feeder space should not be reduced for best results. The 8 to 16-week data with modification based on previous results with this same group of turkeys are presented in Table 7. In this period there was no significant difference

TABLE 11.—Effect of feeder space upon growth, feed conversion and mortality of Large-type White turkeys*

16 to 24 weeks†

Feeder space per poult† (linear inches)	Av. wt. (lbs.)		Feed conv. (lbs.)	Mortality (total No. died)
	Males	Females		
1.0	19.3	12.6	6.7	0
2.0	19.4	12.8	6.8	0
3.0	19.2	12.6	6.7	0
	NS	NS	NS	

*Floor space was constant at five square feet per poult.
†Average of four replicate groups 36 poults each.
‡Tube-type hanging feeders used throughout.

TABLE 12.—Effect of feeder space upon growth, feed conversion and mortality of Large-type White turkeys*

0 to 8 weeks†

Feeder space per poult‡ (linear inches)	Av. wt. (grams)		Feed conv. (lbs.)	Mortality (total No. died)
	Males	Females		
0.5	1449	1194	2.2	12
1.0	1525	1247	2.2	19
1.5	1509	1279	2.2	13
	NS	NS	NS	

*Floor space was constant at two square feet per poult.
†Average of triplicate groups of 100 poults each.
‡Trough feeders were used to three-weeks and tube-type hanging feeders thereafter

TABLE 13.—Effect of floor space on growth, feed conversion and mortality†

TRIAL 1

Large-type Whites, 0-8 Weeks

Floor Space (Sq. Ft.)	Av. No. Poults per group	Av. Gains (Grams)		Feed Conv. (Lbs.)		Mortality (Total No. Died)	
		Males	Females	Males	Females	Males	Females
1.5	80	1640	1380	2.2	2.2	4	3
2.0	60	1649	1385	2.2	2.3	3	4
3.0	40	1692	1377	2.2	2.3	5	0
		NS	NS	NS	NS		

TRIAL 2

Small-type White Females, 0-8 Weeks

Floor Space (Sq. Ft.)	Av. No. Poults per group	Av. Gains (Grams)	Feed Conv. (Lbs.)	Mortality (Total No. Died)
1.5	120	1484	2.3	8
2.0	90	1554	2.4	4
2.5	72	1429	2.3	3
3.0	60	1544	2.3	2
		NS	NS	

TRIAL 3

Large-type White, 0-8 Weeks

Floor Space (Sq. Ft.)	Av. No. Poults per group	Av. Gains (Grams)		Feed Conv. (Lbs.)		Mortality (Total No. Died)	
		Males*	Females	Males	Females	Males	Females
1.0	120	1623	1362	2.2	2.1	4	11
1.5	80	1644	1356	2.1	2.3	5	3
2.0	60	1706	1381	2.1	2.3	6	1
			NS	NS	NS		

*Significant—P .05.

†Feeder space was constant at 0.5 inch per poult. Trough feeders used to 3 weeks and hanging feeders (tube-type) thereafter. Average of duplicate groups.

due to feeder space; but there was a significant difference in favor of the females on the two square feet of floor space. This is difficult to explain and may be a chance occurrence.

The data for the last trial in this series with Small-type White turkeys is presented in Table 8. There were five replications and no significant differences were noted with the different amounts of feeder space. The coefficient of variation was not different due to feeder space, indicating that the different feeder space allowances provided in these trials did not affect the variability in growth at 8 weeks of age in turkey poults.

Tables 9, 10 and 11 concern Large-type White turkeys during the periods 0 to 8, 8 to 16 and 16 to 24-weeks respectively. There were no significant differences in the average weights of males or females during any phase of this experiment.

When feeder space was reduced to 0.5 inch per poult, there was still no significant difference in growth of Large-type White turkeys. These data are presented in Table 12.

The data presented in Table 13 concerns two floor space trials with Large-type White turkeys and one with Small-type White turkeys. In trial 1 Large-type White poults were confined to 1.5, 2.0 and 3.0 square feet of floor space to 8 weeks of age. The males showed a trend of increased gain as the floor space increased, while the females did not show the same trend in growth. In trial 2 Small-type White poults were provided 1.5, 2.0, 2.5 and 3.0 square feet of floor space. The greatest gains were obtained when 2.0 square feet of floor space were allowed to 8 weeks of age. There was a tendency for increased mortality as the floor space was reduced from 3.0 to 1.5 square feet per poult. In trial 3, using Large-type White poults, the floor space allowance was reduced further, comparing 1.0, 1.5 and 2.0 square feet. Again the males showed a trend of increased gain as floor space per poult was increased. A similar trend was obtained for the females, but the difference was not as great as for the males. In this trial the difference in average gains was significant for the males.

CONCLUSIONS

Small-type White turkeys. Under the conditions of these experiments as little as 0.5 inch of feeder space per poult with tube-type hanging feeders was adequate from the standpoint of growth to eight weeks of age. There were no consistent differences in feed conversion or mortality during this period. One square foot of floor space per poult appeared adequate; but in one trial an interaction between feeder and floor space was observed.

Less than one inch of feeder space was sufficient with this type of turkey from 8 to 16-weeks and one inch gave equal results with larger amounts of feeder space during the 16 to 24-week period. The floor space requirements of turkeys requires more investigation before definite recommendations can be made for the periods after eight weeks of age.

Large-type White turkeys. Growth was adequately supported with as little as 0.5 inch of feeder space per poult with tube-type feeders during the first eight weeks. Based on only one trial, 1.5 inches of feeder space was adequate for growth from 8 to 16-weeks with this type of turkey and feeder, while 1.0 inch was adequate after 16 weeks. Maximum poult gains were obtained when 1.5 to 2.0 square feet of floor space were provided to 8 weeks of age. However, 1.0 to 1.5 square feet of floor space produced a greater total weight gain, resulting in more economical use of brooder house space. Ventilation and wet litter problems may arise at certain seasons of the year when the floor space allowance is less than 2.0 square feet per poult.

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